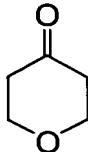


[Document name] Claims

[Claim 1]

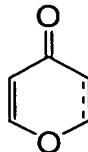
A process for preparing tetrahydropyran-4-one represented by the formula (1) :



(1)

5

which comprises reacting at least one kind of dihydropyran-4-one and pyran-4-one represented by the formula (2) :



(2)

10 wherein --- represents a single bond or a double bond,

and hydrogen

- (a) in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent, or
- (b) in the presence of an anhydrous metal catalyst in which
15 a hydrated metal catalyst is subjected to dehydration treatment, in a hydrophobic organic solvent.

[Claim 2]

The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the dehydration treatment is
20 carried out by using an organic solvent which can be subjected to azeotropic distillation with water.

[Claim 3]

The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the metal catalyst contains
25 at least one metal atom selected from the group consisting of palladium, platinum and nickel.

[Claim 4]

The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the aprotic solvent is an
30 aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon,

an aromatic hydrocarbon, a halogenated aromatic hydrocarbon, a carboxylic acid ester, an ether, or a mixture thereof.

[Claim 5]

5 The process for preparing tetrahydropyran-4-one according to Claim 1, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

[Claim 6]

10 The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the hydrophobic organic solvent is an aliphatic hydrocarbon or an aromatic hydrocarbon.

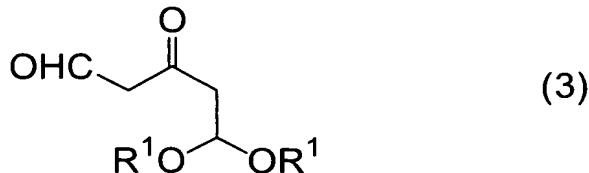
[Claim 7]

15 The process for preparing tetrahydropyran-4-one according to Claim 1, wherein the compound represented by the formula (2) is pyran-4-one represented by the formula (2'):



20 [Claim 8]

The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



25 wherein R¹ represents an alkyl group, and two R's may be bonded to each other to form a ring, or an equivalent thereof, or a salt thereof with an acid.

[Claim 9]

30 The process for preparing tetrahydropyran-4-one

according to Claim 8, wherein a salt of the 5,5-dialkoxy-3-oxopentanal represented by the formula (3) or a salt of an equivalent thereof is a compound obtained by reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



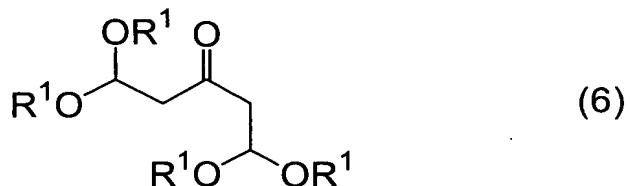
5

wherein R¹ has the same meaning as defined above, and a formic acid ester represented by the formula (5):



- 10 wherein R² represents an alkyl group,
 in an organic solvent in the presence of a base,
 [Claim 10]

The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by subjecting 15 1,1,5,5-tetraalkoxypentan-3-one represented by the formula (6):



- 20 wherein R¹ has the same meaning as defined above, or an equivalent thereof to cyclization in the presence of an acid.

[Claim 11]

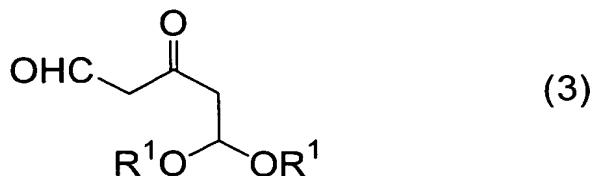
The process for preparing tetrahydropyran-4-one according to Claim 7, wherein the pyran-4-one represented by the formula (2') is a compound obtained by reacting 25 1,1-dialkoxybutan-3-one represented by the formula (7):



wherein R¹ has the same meaning as defined above, or an equivalent thereof and a formic acid ester represented by the formula (5) :



5 wherein R² has the same meaning as defined above, in an organic solvent in the presence of a base, to form a salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3) :



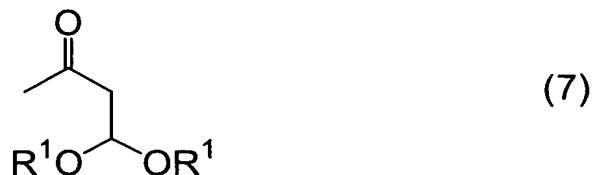
10 wherein R¹ has the same meaning as defined above, or a salt of an equivalent thereof, then, reacting an acid thereto.

[Claim 12]

15 The process for preparing tetrahydropyran-4-one according to Claim 11, wherein the organic solvent is an aromatic hydrocarbon or a nitrile.

[Claim 13]

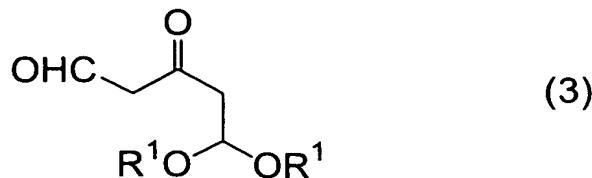
A process for preparing tetrahydropyran-4-one which comprises two steps of
20 (A) cyclization step in which 1,1-dialkoxybutan-3-one represented by the formula (7) :



wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,
25 and a formic acid ester represented by the formula (5) :



wherein R² represents an alkyl group, are reacted in an organic solvent in the presence of a base, to prepare a salt of 5,5-dialkoxy-3-oxopentanal
30 represented by the formula (3) :



wherein R^1 has the same meaning as defined above,
or a salt of an equivalent thereof, and reacting the salt
with an acid to prepare crude product containing pyran-4-
one represented by the formula (2'):



as a main component, then,

- (B) reduction step in which the crude product containing the pyran-4-one as a main component and hydrogen are reacted in the presence of a metal catalyst,
 - 10 (a) in a mixed solvent of an aprotic solvent and an alcohol solvent, or
 - (b) in the presence of an anhydrous metal catalyst in which a hydrated metal catalyst is subjected to dehydration
- 15 treatment, in a hydrophobic solvent, to prepare tetrahydro-pyran-4-one represented by the formula (1):



[Claim 14]

The process for preparing tetrahydropyran-4-one
20 according to Claim 13, wherein the metal catalyst contains at least one metal atom selected from the group consisting of palladium, platinum and nickel.

[Claim 15]

The process for preparing tetrahydropyran-4-one
25 according to Claim 13, wherein the aprotic solvent is an aliphatic hydrocarbon, a halogenated aliphatic hydrocarbon, an aromatic hydrocarbon, a halogenated aromatic hydro-

carbon, a carboxylic acid ester, an ether, or a mixture thereof.

[Claim 16]

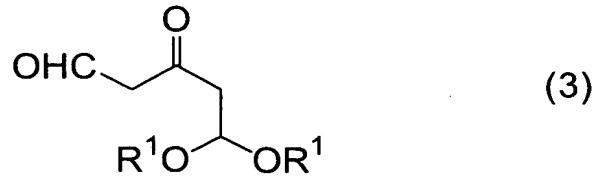
The process for preparing tetrahydropyran-4-one
5 according to Claim 13, wherein an alcohol solvent in the mixed solvent is contained in the range of 5 to 95% by volume.

[Claim 17]

A process for preparing pyran-4-one represented by
10 the formula (2'):



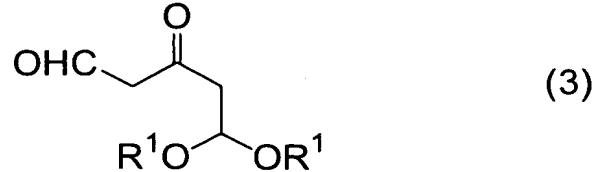
which comprises reacting 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



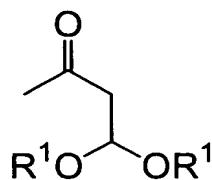
15 wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,
or an equivalent thereof, or a salt thereof with an acid.

[Claim 18]

A process for preparing a salt of 5,5-dialkoxy-3-
20 oxopentanal represented by the formula (3):



wherein R¹ has the same meaning as defined above,
or an equivalent thereof, which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula (4):



(4)

wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,

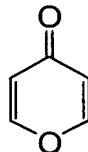
and a formic acid ester represented by the formula (5):

$$5 \quad \text{HCO}_2\text{R}^2 \quad (5)$$

wherein R² represents an alkyl group,
in an organic solvent in the presence of a base.

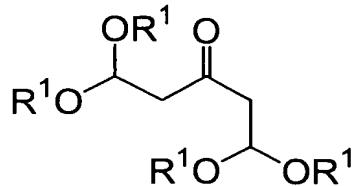
[Claim 19]

A process for preparing pyran-4-one represented by
10 the formula (2'):



(2')

which comprises subjecting 1,1,5,5-tetraalkoxy pentan-3-one represented by the formula (6) :



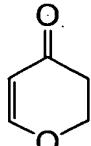
(6)

wherein R¹ represents an alkyl group, and two R¹'s may be bonded to form a ring,

or an equivalent thereof to cyclization in the presence of an acid.

[Claim 20]

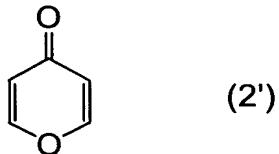
20 A process for preparing dihydropyran-4-one represented by the formula (2''):



(2")

which comprises reacting pyran-4-one represented by the

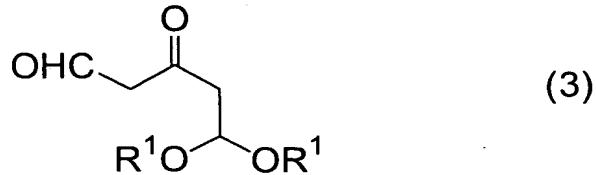
formula (2'):



and hydrogen in the presence of a metal catalyst, in a mixed solvent of an aprotic solvent and an alcohol solvent.

5 [Claim 21]

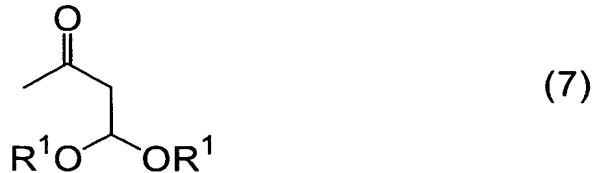
A sodium salt of 5,5-dialkoxy-3-oxopentanal represented by the formula (3):



wherein R¹ represents an alkyl group, and two R¹'s may
10 be bonded to each other to form a ring,
or a sodium salt of an equivalent thereof.

[Claim 22]

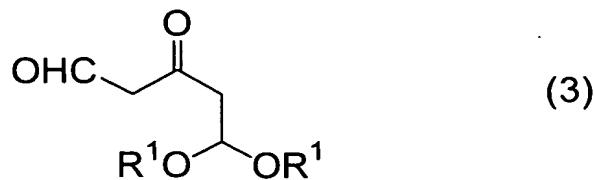
A process for preparing pyran-4-one which comprises reacting 1,1-dialkoxybutan-3-one represented by the formula
15 (7):



wherein R¹ represents an alkyl group, and two R¹'s may
be bonded to each other to form a ring,
or an equivalent thereof and a formic acid ester represented by the formula (5):



wherein R² represents an alkyl group,
in an organic solvent in the presence of a base, to form a
salt of 5,5-dialkoxy-3-oxopentanal represented by the
25 formula (3):



wherein R¹ has the same meaning as defined above,
 or a salt of an equivalent thereof, and then, reacting an
 acid to the salt to prepare pyran-4-one represented by the
 5 formula (2'):



[Claim 23]

Use of an anhydrous metal catalyst for reducing
 pyran-4-one and dihydropyran-4-one.

10 **[Claim 24]**

The process for preparing tetrahydropyran-4-one
 according to any one of Claims 1 to 16, wherein the
 anhydrous metal catalyst is a material obtained by
 subjecting a hydrated metal catalyst to dehydration
 15 treatment using an organic solvent which can be subjected
 to azeotropic distillation with water.